

PORTLAND HARBOR SUPERFUND SITE

Update 2004

The ongoing remedial investigation of the Portland Harbor Superfund Site will include a major round of sampling in 2004 and 2005 to determine the nature and extent of contamination. The physical and biological systems in the lower Willamette River have been the focus of previous rounds of sampling and now the chemical system will be the focus of the upcoming rounds of sampling.

BACKGROUND

Listed as a priority by the U.S. Environmental Protection Agency (EPA) in December 2000, the Site is a high profile and complex project. The ongoing investigation has initially focused on an area of the Lower Willamette River from approximately Swan Island to Sauvie Island, north of downtown Portland. EPA will determine the final boundaries of the Site after the study is complete.

The Lower Willamette Group (LWG) represents a small portion of the 69 entities that have been identified by EPA as having potential responsibility at the Site. In 2001, ten members of the LWG voluntarily stepped forward to conduct the Portland Harbor Remedial Investigation and Feasibility Study (RI/FS).¹ LWG members began fieldwork at the Site in the spring of 2001 – in advance of signing an Administrative Order on Consent – and have a goal to gather information and study options for cleanup that will allow the EPA to make a cleanup decision years earlier than what is typical at a complex sediment Superfund Site.

EPA oversees the in-water and near shore sediment investigation. Oregon's Department of Environmental Quality (DEQ) has oversight of the upland cleanups and source control. Six Tribal governments and three federal and state natural resource agencies are also partners with EPA in the process. An overall workplan for the Site as well as detailed plans for additional sampling have been developed by the LWG and approved by EPA and its partners.

The project is technically complex; dealing with multiple contaminants coming from many different sources over more than 100 years of industrial use of the river. The river provides a key economic, recreational, and ecological resource to Portland and the entire Northwest including providing habitat to many species of fish and wildlife.

The LWG has spent more than \$17 million on the RI/FS process. This includes funding for the development of work and sampling plans; gathering and analyzing samples and data; and \$3.6 million in oversight costs for agencies and Tribes involved at the site (\$1.2 million to EPA, \$1 million to DEQ and \$1.4 million to six Tribal governments).

The LWG has made public involvement a priority and has actively worked with the Portland Harbor Community Advisory Group and others in the community. LWG members have briefed members of the local media, professional organizations, Portland State University classes, the Willamette River Cleanup Authority and members of the Oregon and Washington Congressional delegations on Site activities.



Site Map

¹ LWG members that have signed the order with EPA are: ATOFINA Chemicals, Inc.; Chevron USA, Inc.; City of Portland; ConocoPhillips; Gunderson, Inc.; Northwest Natural Gas; Oregon Steel Mills, Inc.; Port of Portland; Time Oil Company; and Union Pacific Railroad. The LWG is open to additional PRPs joining the LWG but only EPA can order PRPs to participate at the Site.

LWG GOALS

- Work toward an expedited Portland Harbor cleanup that fully meets the requirements of applicable law
- Prepare a technically and legally sound, cost effective Remedial Investigation/Feasibility Study
- Let science guide the successful resolution of technical issues at the Site
- Work closely with EPA and its Federal, State and Tribal partners
- Involve the public through communication and outreach

The Portland Harbor Remedial Investigation and Feasibility Study (RI/FS) Programmatic Work Plan

The Portland Harbor RI/FS Programmatic Work Plan (Work Plan) was prepared by the LWG and approved by EPA and describes how the LWG will study contamination in sediments and water at the Site.

The objectives of the RI/FS are to:

- Define areas to be cleaned up (Sediment Management Areas).
- Identify areas of the Site that may need to be addressed before the final EPA record of decision (ROD) or under separate processes (Early Actions and Operable Units).
- Identify methods of cleanup (Remediation Recommendations).
- Identify how sediments posing risk might be disposed of, if disposal is one of the appropriate cleanup methods (Disposal Options).
- Identify where the contamination comes from (Definition of Chemical Sources) so that sources can be controlled prior to cleanup.
- Understand how the cleanup will be coordinated with other river activities, such as maintenance dredging.
- Develop information consistent with natural resource restoration in the harbor.

From these objectives, it is possible to identify the types of information, logical phases of work and milestones that will need to be developed in the RI/FS. Overall, this process maps out the routes necessary to complete the RI/FS and provide sufficient information for cleanup decisions.

REMEDIAL INVESTIGATION

The primary purpose of the Remedial Investigation (RI) is to investigate the nature and extent of contamination in sediment and water at the Site and assess the potential risk that these sediments and water pose to human health and the environment. Major components of the RI include:

- identifying data needs,
- developing sampling plans to fill in data gaps, and
- generating and evaluating the resulting data.

Historical and current data on the river that includes information about the physical, chemical and biological systems of the Lower Willamette are reviewed and evaluated to develop the preliminary “conceptual site model” for the Site; this “model” forms the basis for determining what additional data are needed. The model is essentially a detailed description of the physical, chemical, and biological systems and processes at the site. The conceptual site model is periodically updated and focused during the RI as additional sampling data are collected and evaluated, allowing the investigation to increasingly focus on the most important data needs.

HUMAN HEALTH RISK ASSESSMENT

An assessment of risks to human health is a part of the remedial investigation. The overall objective of the baseline Human Health Risk Assessment (HHRA) for the Site will be to determine whether exposure to contaminants present in the sediments, water or fish and shellfish that people consume from the Site result in unacceptable risks to human health. Data collected and analyzed in the first two rounds of sampling will be important to this task. The approach and methods used will be based on EPA national and EPA Region 10 guidance, and will consider Oregon DEQ guidance.

ECOLOGICAL RISK ASSESSMENT

An assessment of risks to fish, other aquatic organisms and wildlife is also a part of the remedial investigation. The ecological risk assessment (ERA) for the Portland Harbor RI/FS will also be conducted according to current EPA guidance for ecological risk assessment. An ecological risk assessment is an integral part of the RI/FS process. It draws from many fields of science, such as environmental toxicology, ecology and environmental chemistry, to characterize potential adverse effects to aquatic organisms or wildlife that may forage at the Site. Data collected and analyzed in the first two rounds of sampling will be important to this task.

FEASIBILITY STUDY

The primary purpose of the Feasibility Study (FS) is to determine appropriate cleanup options for contaminants in sediment and water that pose unacceptable risks to humans, fish and wildlife. The FS Report will document:

- Any data used to support the evaluation and recommendation of remedial alternatives.
- The remedial alternatives that were developed, screened, refined and evaluated.
- How well each alternative meets the CERCLA criteria for remediation.
- How these remedial alternatives compare against each other.
- The recommended remedial alternative(s) for each sediment management area.

PROPOSED PLAN AND RECORD OF DECISION

After the RI/FS is completed, EPA will prepare a Proposed Plan, which is widely distributed for public review and comment. The Proposed Plan presents EPA's preliminary recommendation concerning how best to address contamination at the site, presents alternatives that were evaluated, and explains the reasons the agency recommends the Preferred Alternative.

After EPA incorporates public input to the Proposed Plan, EPA will issue a Record of Decision (ROD) for the site. The ROD documents the final cleanup remedy that is selected for the site and the rationale for selecting it. The ROD also summarizes technical information from the RI/FS, and explains the contamination problems the remedy seeks to address.

After EPA has issued the ROD it will order responsible parties to:

- Create a Remedial Design that includes engineering plans and specifications to conduct the cleanup.
- Implement the cleanup.
- Monitor the Site after cleanup.

The responsible parties for these phases of the cleanup will be determined after the ROD and will include more than just LWG members. PRPs not currently participating at the Site will be ordered by EPA to pay for their share of the cleanup. In addition, given the long history of industrial use, it is anticipated that some of the responsible parties cannot be located and therefore a certain portion of the cleanup may be considered an "orphan share" and funded through other allocation processes (e.g. the federal Superfund or assigned to other parties at the Site).

SITE REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN AND ROUND 2 FIELD SAMPLING PLANS APPROVED

In June 2004, the EPA approved the Remedial Investigation and Feasibility Study (RI/FS) Programmatic Work Plan and the Field Sampling Plans for what is known as “Round 2.” The work plan sets the framework for the environmental investigation, and the sampling plans describe what exactly will be sampled and how. The Work Plan refers to the Initial Study Area, known as the ISA, which is focused on River Mile 3.5 to River Mile 9.2. The ISA does not define the Site. Due to many factors, the ISA was a logical area to begin the remedial investigation. EPA will determine the official geographic boundaries after the RI/FS is completed.

SAMPLING ACTIVITIES

While reaching agreement on these documents is a milestone, work at the Site has been ongoing.

In 2001, Round 0 sampling was performed where the LWG collected data in advance of the approved work plan. These data will be used to evaluate how sediment moves into the Site from upriver and how it moves downstream.

In 2002, Round 1 sampling focused primarily on the physical and biological systems in the river. These studies focused on understanding the physical system and addressing critical ecological and human health data needs.



Gathering fish samples

The following types of samples and data have been gathered and are being analyzed:

SEDIMENT TREND ANALYSIS 836 data points were collected from the confluence of the Willamette and the Columbia rivers to Willamette Falls to evaluate how sediment is coming into and leaving the Site. This will be important when evaluating methods of cleanup to ensure enough is known about how different cleanup technologies would be affected by changes in the river bottom over time.

SEDIMENT PROFILE IMAGING 523 images from 478 stations of sediment photographs were taken to record the sediment's composition and life forms. These show the types of sediments (fine, rocky, etc.) and what organisms live in the river bottom.

BATHYMETRY Bathymetry was recorded over two years using new technology to produce 3-dimensional images of the river bottom to measure its height and characteristics. Having this underwater map of the river bottom will help give an overall picture of how the river bottom changes from season to season.

HABITAT ANALYSIS More than 450 crayfish, clams and other sediment-dwelling organisms have been gathered and analyzed. Knowing if contamination has affected these organisms and to what extent will help in the risk assessment process.

FISH SAMPLING More than 1,450 resident fish covering 12 different species have been gathered and analyzed. These samples will be used to determine risks to both ecology and human health from sediments. The samples were also used by the Oregon Department of Human Services in its revision of fish advisories for resident Willamette River fish in the Portland Harbor Area.

CHEMICALS ANALYZED Testing was conducted for nearly 400 possible chemicals including metals, polyaromatic hydrocarbons (found in fuels and wood preservatives), pesticides, and polychlorinated biphenyls (PCBs).

HISTORICAL DATA A comprehensive database of pre-existing data has been compiled that includes: 144 bioassay tests (toxicity testing), 506 surface sediments (the first few feet of sediment), 335 subsurface sediments (deeper cores), and others. This data will become a part of the overall sampling profile for use in the environmental study.

Results

The first round of samples has been analyzed and the results are being evaluated. A summary characterizing the Round 1 results is being prepared by the LWG. The samples of fish taken by the LWG were also shared with the Oregon Department of Human Services/Public Health that issued a revised fish advisory for the consumption of resident fish in the Portland Harbor Area.

Round 2 Sampling

Round 2 sampling will be conducted in 2004 and 2005 and will focus on the nature and extent of contamination. Additional rounds of sampling may occur to fill the data gaps from the first two rounds of sampling. The LWG hopes to complete work on the RI/FS by the end of 2007.

In 2004 and 2005, Round 2 sampling will be used to determine the distribution of chemicals in sediments and water at the Site. This means identifying the types of contaminants in the sediments and water and where they are found. Samples will be collected within, upstream and downstream of the Initial Study Area.

Planned sampling activities in Round 2 includes:

SURFACE SEDIMENT SAMPLES 517 surface sediment

(0 to -1 foot depth) samples throughout the Site will be taken in 2004. Of these samples, 220 will be sent to a laboratory to conduct toxicity testing. Two toxicity tests using small aquatic organisms that live in the sediments (benthic organisms) will be completed for each of these 220 samples. The purpose of the toxicity testing is to determine if the sediments have chemicals at levels that may cause harm to aquatic organisms that live and feed in the sediment. Samples will be taken from the upper 12 inches of the river bottom. Most of the biological activity of sediment-dwelling organisms occurs in this first one-foot of sediment. Therefore, the measurement of the types of contamination and an assessment of their potential impacts on those organisms are needed for the risk assessment process.

DEEP CORE SAMPLES 197 deeper core (14 to -20 foot depth) samples will be taken from various points along the river in 2004; an additional 30 core samples are expected to be taken in 2005. Deep cores measure up to 20 feet and will be pulled out of the sediment. Samples will be taken from various depths of the core. These samples will help provide information on how far down contamination might be located in the sediment.

Through the risk assessment process, this nature and extent information will be used to help define the Site boundaries and any operable units within the Site, (i.e., discrete locations in the Site that require further evaluation during the remedial design/remedial action phase of the program that will follow the RI/FS). As part of the risk assessment process, in accordance with EPA guidance, background concentrations of contaminants that may contribute to unacceptable risk will be identified. This information will assist in helping to understand the role background levels of contaminants have in contributing to unacceptable risk and in evaluating remedial options (including those related to recontamination).

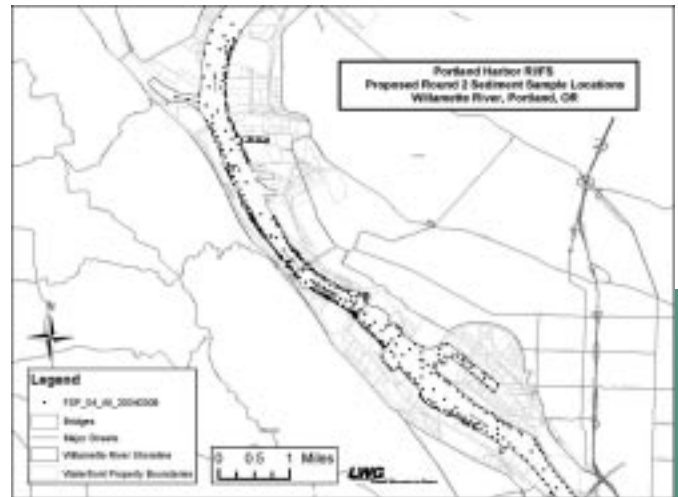
EARLY ACTIONS

Early Actions are site-specific removals of contamination within an overall Superfund Site that can be conducted on an expedited schedule. Two LWG members have signed orders with EPA to conduct Early Actions within the Portland Harbor Superfund Site, and a third is working with EPA to define another. Additional early removal actions will be negotiated as the opportunity or need arises. In addition, cleanup work continues at the McCormick & Baxter Site, which is a separate Superfund Site within the Portland Harbor Site.

PORT OF PORTLAND, TERMINAL 4 The Port has completed the in-water investigation at Terminal 4, and is using the data and EPA-required criteria to develop cleanup alternatives. The cleanup alternatives will be presented in an Engineering Evaluation and Cost Analysis (EE/CA) and EPA will select the cleanup method in Early 2006. The Port has initiated a public outreach program to seek input on development of the cleanup alternatives for the EE/CA, and the EE/CA is scheduled to be available for public comment in May 2005.

GASCO NW Natural Gas has agreed to remove a tar-body and is currently evaluating engineering options to accomplish this objective. The tar is a result of historic operations from the oil gasification plant that operated from 1913 to 1956.

ATOFINA ATOFINA Chemicals is working with EPA to define an appropriate Early Action. The scope and methods of the Early Action are yet to be determined.



Round 2 Sampling

PRP Search

EPA and the Lower Willamette Group are working together to conduct a comprehensive search for potentially responsible parties (PRPs) associated with the contamination of the Portland Harbor Superfund Site. In 2000 “general notice” letters were sent to 69 current property owners, tenants, and governments. However, the process of actually evaluating who is responsible for contamination is a lengthy one. It will include research into public records and requests for information from both current and former generators, transporters, owners and operators of facilities along the Lower Willamette River. With a history of more than 150 years of industrial use finding those potentially responsible parties is a complicated but very important search process.

Ten of the parties who were initially identified by EPA have agreed through an Administrative Order on Consent to pay for the remedial investigation and feasibility study (RI/FS), but have reserved the right to recover a portion of those costs later from other liable parties. PRPs who have not signed the AOC are not off the hook for paying for the cleanup. Through the environmental investigation and the PRP search, the EPA will determine who else it believes should pay for the cleanup and use its enforcement authority to compel those parties to pay. Additionally, parties who have already incurred costs have the right to sue to recover those costs from other responsible parties.

Cultural Resources

After extensive discussions with six Tribal Governments, the LWG submitted a proposed statement of work for the cultural resources analysis to EPA in January 2004. EPA approved the proposed statement of work in June 2004. This cultural resources analysis will include an extensive review of information on the archaeology, Native peoples, and Euroamerican history of the lower Willamette River from its mouth upstream to Willamette Falls. The objective of the analysis is to identify locations at which archaeological and historical resources are known or likely to be present. In addition, the LWG has contracted with four Tribes (Grand Ronde, Nez Perce, Umatilla, and Warm Springs) to gather information from Tribal elders on past and present Tribal use of the project area.

WHAT HAPPENS NEXT?

Here is a brief schedule of Site related activity and what happens during these tasks:

	Summer 2004	Fall 2004	Winter 2005	Spring 2005	Summer 2005	Fall 2005	Winter 2006	Spring 2006	Fall 2006	Spring 2007	Winter 2007
MILESTONES	Work Plan and Field Sampling Plans Approved	Round 1 Site Characterization Summary Report				Comprehensive Round 2 Data Report and Preliminary Human Health and Ecological Risk Evaluations				Remedial Investigation Report and Human Health and Ecological Risk Assessments	Completed Remedial Investigation/ Feasibility Study
ACTIVITIES	Round 2 Surface Sediment Sampling	Round 2 Sediment Core Sampling		Round 2 Sediment Core Sampling					Round 3 Sediment Sampling		
		Round 2 Surface Water Sampling	Round 2 Surface Water Sampling				Round 3 Surface Water Sampling	Round 3 Surface Water Sampling	Round 3 Surface Water Sampling		
		Possible Groundwater Pilot Study				Round 2 Groundwater Sampling			Round 3 Groundwater Sampling		
		Step 1 Hydrodynamic Modeling Completed			Step 2 Hydrodynamic Modeling Completed						

Surface Sediment Sampling – sediment samples will be taken from the upper 12 inches of the bottom of the river. Most of the biological activity of sediment-dwelling organisms occurs in this first one-foot of sediment. Therefore the measurement of the types of contamination and an assessment of their potential impacts on those organisms are needed for the risk assessment process.

Sediment Core Sampling – deep cores measuring up to 20 feet will be pulled out of the sediment and samples will be taken from various depths of the core. These samples will help provide information on how far down contamination might be located in the sediment.

Surface Water Sampling – testing will also be conducted on the water within the Site, as well as water coming into and moving through the Site from upriver.

Groundwater Sampling – samples of groundwater taken at or near the river's edge will provide data on whether contaminants may be entering the river from underground aquifers.

Hydrodynamic Modeling – a hydrodynamic model will integrate information about the riverbed, water flow, sediment movement and other factors and predict how the river might act in the future. This model will be important in determining the effectiveness of different cleanup methods.

FOR MORE INFORMATION:

US Environmental Protection Agency: <http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/ptldharbor>
Oregon Department of Environmental Quality: www.deq.state.or.us/nwr/ph.htm